

OBITUARY

MARION STILWELL CAVE
(1904–1995)

When Marion Cave passed away on 26 September 1995, at age 91, it marked the end of a remarkable life and a significant career in botanical research. In a period spanning nearly 40 years, Marion Cave made pathbreaking contributions to plant genetics, cytology, and embryology that went well beyond her modest status as a research associate in the Botany Department, University of California, Berkeley. Moreover she was such a significant influence on graduate students and foreign colleagues that it was a surprise to many that she did not hold a regular academic post. Not only did she provide an example of the highest standards of technique and critical thinking, but she also was a model of personal determination and integrity.

Marion was born in Rochester, New York, on February 11, 1904. Her family later moved to Denver, Colorado. Marion attended the University of Colorado, where she obtained an A.B. degree in Biology in 1924, election to Phi Beta Kappa, and an A.M. degree. She came to Berkeley as a graduate student and, in 1928, married Roy Clinton Cave. Roy earned a Ph.D. degree in Economics at Berkeley, and then made his career as a Professor of Economics at San Francisco State University. Marion obtained a Ph.D. in genetics in 1936, with a dissertation on the cytogenetics of *Crepis*, under the direction of Ernest Brown Babcock. This work demonstrated that the "generic" differences used to separate a species given generic status as *Rodigia* were due to slight genetic differences from the widespread *Crepis foetida*, a pioneering application of genetics to plant taxonomy.

From 1936 to 1943, Marion worked as a Research Associate in the Botany Department at Berkeley, launching a series of studies on sporogenesis and gametogenesis of various Liliaceae. She also carried out a series of collaborative studies with W. W. Wagener on the cytology and cytogenetics of fungi, including members of the genera *Phytophthora*, *Cronartium*, and *Fomes*. It was during this period that she began her 20-year-long collaboration with Lincoln Constance on studies of chromosome numbers in the Hydrophyllaceae. At the time this series was initiated, this collaboration on Hydrophyllaceae represented one of the early applications of chromosome studies and numbers to phylogenetic deductions.

Marion and Roy spent 1944–45 in Washington, D.C., working for the U. S. Government in the Office of the Coordinator of Inter-American Affairs. During that time, she published a series of translations of Forest Legislation in a range of Central American, South American, and Caribbean countries.

Returning to Berkeley in 1945, Marion resumed her status as Research Associate in the Botany Department. Not only did she continue her collaborative work with Constance, but she initiated new associations with entirely different goals. For example, in the early 1950s Marion developed a research collaboration with Dr. Mary Pocock of Rhodes University in Grahamstown, South Africa. Pocock was one of the world's authorities on the systematics and morphology of the Volvocalean green algae. They collaborated in publishing one of the first studies on the karyology of algae. Not only did they develop new techniques to study this material, but they also were working in largely uncharted territory with regards to algal chromosome morphology and numbers. This was one of the earliest algal chromosome papers to have photographic documentation. Marion was awarded a Guggenheim Fellowship to support her visit to South Africa to carry out this collaboration.

During the 1950s, Marion had an altogether different type of research association with Spencer W. Brown of the Berkeley Genetics Department. From the mid- to late

1950s, they published elegant experiments on the role of pollen grain and stigma/ovule interactions in dominant lethals of *Lilium*. These studies established, for the first time, the existence of a "preferred zone" of ovules to which the pollen tubes were first attracted.

In this period and into the 1960s, Marion continued her studies of embryology in Liliaceae and became one of the foremost proponents of the use of embryological data in plant systematics. Not only did she produce significant publications on this subject, but she also organized a symposium for the Ninth International Botanical Congress in Montreal, Canada, in 1959.

One of the most fascinating studies Marion made was initiated because of an international controversy that had developed in the field of plant embryology. In 1957, Russian embryologists M. S. Yakovlev and M. D. Yoffe published an account of embryogenesis in species of the genus *Paeonia* (Paeoniaceae), in which they reported that early development of its proembryo was free-nuclear like that of gymnosperms. The Russians' article was published in the Indian Journal "Phytomorphology", founded and edited by the famous embryologist, Panchanan Maheshwari. Maheshwari did not believe the Russian report and had one of his own students, Dr. Prem Murgai, repeat the work. They came to an entirely different interpretation from the Russians.

Marion Cave became interested in this controversy. Together with two Berkeley graduate students, Howard Arnott (now at University of Texas, Arlington) and Stanton A. Cook (now at University of Oregon, Eugene), she published a much more extensive and critically documented 1961 paper that supported the Russians' interpretation. Marion had not expected to find that the Russians were correct, but faced with her own critical data and bedrock of scientific integrity, she could not interpret her results otherwise.

An interesting sidebar to this story is that Maheshwari visited Berkeley in the fall of 1963, to meet with Marion and convince her of the validity of the Indian interpretation. To this purpose he had brought slides from Dr. Murgai's study. One of us (DRK) had the pleasure of attending their meeting. Maheshwari was a large man, virtually twice the size of Marion, with an ebullient, dominating personality. It was clear that he was used to winning arguments based largely on the force of his personality. Thus, in that session, he attempted to overpower Marion. However, she would not have any of it. In her typical fashion, she quietly stuck to her guns and effectively pointed out where he and his student had made their mistake. She even had a young graduate student with some embryological experience look at his slides. It was clear, even to a novice, that Maheshwari and his student had misinterpreted their preparations. This episode illustrated both Marion Cave's strong resolve and the fact that she could never be cowed by any authority figure, no matter how famous.

Another example of Marion's strong will and personal resolve occurred after her 1970 monograph *Chromosomes of Californian Liliaceae* was reviewed by a member of the staff at Kew Gardens in the Kew Bulletin. The reviewer accused Marion of having inked in the images of chromosomes in her photographs because her preparations were so beautiful. Needless to say, Marion was madder than the proverbial "wet hen" and wasted no time in setting that reviewer straight!

One of Marion's lasting contributions to plant cytology and cytogenetics was the initiation of the "Index to Plant Chromosome Numbers", of which she was the initial Editor, from 1956-1964, and Associate Editor from 1964-1974. The index is an annual compilation of published chromosome numbers from the plant literature. It was organized with a group of compilers who scoured the literature in assigned journals, then sent in chromosome counts with the literature citation to the editor. Marion not only conceived the idea for this reference work, but also procured National Science Foundation grants to support its launching. It has proved to be an enduring and useful resource.

Beyond her own research and scholarly contributions, Marion contributed significantly to the education and training of graduate students at Berkeley. Former grad-

uates Howard Arnott, Sherwin Carlquist, Stan Cook, and Florence and Herb Wagner have written to indicate how central Marion was to their own research training. She not only taught them, and others, the essentials and finer points of plant microtechnique and photomicrography, but also how to interpret the more arcane aspects of plant embryology and chromosome structure.

Her personal generosity was not restricted to the Berkeley campus. An avid traveler world-wide, she developed close personal friendships on virtually every continent and would go out of her way to help wherever there was need. For example, in the post-World War II period, Marion sent slides, coverglasses, and other materials to Dr. Rosalie Wunderlich of the University of Vienna, so that Dr. Wunderlich could restart her embryology research program in war-torn Vienna.

Dr. Florence Wagner, who lived with the Caves for two years after World War II, characterized Marion as "a cheerful complainer and a happy pessimist, a person who was intensely aware of what was wrong with the world but who was a realist with a genuine sense of humor." Marion had an interest in all aspects of life and was an avid reader, gardener, and even designed and made all of her own stylish clothing, and (with Ray) their Berkeley Hills home. At the end of her Berkeley career, she became the Botany Department's resident photographer, making portraits of faculty and graduate students.

Since Marion was not a UC faculty member, she had to carry out her research in the modest space and facilities accorded graduate students. Despite this, she managed to carry out a remarkably diverse series of careful, original, and technically difficult studies. If Marion were beginning her scientific career today, she would have become a full-fledged faculty member in a noted academic institution such as Harvard or Berkeley. However, we doubt that she would have made any more impact. The fact that she accomplished so much without that status underscores her truly remarkable nature and the source of her lasting influence.

Volume 33 (1986) of *Madroño* was dedicated to Marion Cave.

—DONALD R. KAPLAN, LINCOLN CONSTANCE, and ROBERT ORNDUFF, University of California, Berkeley.